

REMARKS

Claims 1, 3-18, and 20-25 are pending. Claims 1, 3, 18, and 20 have been amended and claims 2 and 19 have been canceled. Claims 3, 4, and 20 were indicated to recite allowable subject matter.

Reconsideration of the application is respectfully requested for the following reasons.

In the Office Action, claims 1, 2, 8-13, 17-19, and 21-25 were rejected under 35 USC § 103(a) for being obvious in view of the Bende patent. This rejection is traversed for the following reasons.

Claim 1 recites a method for performing spectral imaging by generating multiple-photon excitation in a specimen. Photoacoustic waves resulting from the excitation are then detected and a spectral image is formed based on the photoacoustic waves. As explained in the specification, Applicant's invention is able to obtain improved performance relative to other types of spectral imaging by implementing a multiple-photon absorption scheme.

According to this scheme, each of a plurality of molecules in a specimen is made to simultaneously absorb N photons, where N is greater than or equal to 2. To emphasize these features of the invention, claim 1 has been amended to recite: "wherein the multiple-photon excitation is generated based on simultaneous absorption of N photons by each of a plurality of molecules in the specimen, where $N \geq 2$." The Bende patent does not teach or suggest these features.

The Bende patent discloses a method for performing photoacoustic spectroscopy. According to this method, a specimen (e.g., tissue) is irradiated with two laser beams at the same time. Molecules in the tissue absorb photons from the beams and become excited. When the excited molecules return to steady state, they emit acoustic waves which are detected to generate a spectral image.

Thus, Bende discloses what is known as a 1P absorption technique. According to this scheme, each excited molecule in the irradiated specimen absorbs one and only one photon, even though the tissue specimen is being irradiated by two laser beams of different wavelengths. In contrast, claim 1 recites a method wherein excited molecules each absorb multiple photons simultaneously. The Bende patent does not teach or suggest these features.

In the Office Action, the Examiner noted that column 6, lines 5-10, of Bende discloses the absorption scheme of the invention. Here, Bende merely discloses focusing two laser beams on tissue simultaneously and that molecules in the tissue absorb light from the beams. However, Bende does not teach or suggest that each excited molecule in the irradiated specimen simultaneously absorbs multiple photons ($N \geq 2$) as recited in claim 1.

Applicant further notes that the multiple-photon absorption technique recited in claim 1 is able to achieve improved performance over 1P techniques for certain spectral imaging applications. According to one non-limiting example, by having each excited molecule simultaneously absorb 2 or more photons, the claimed invention may be applied to perform a cell-by-cell inspection to determine the existence of cancer cells.

Put differently, in an exemplary 2P absorption case, the molecules in the specimen are excited to an enhanced level well above any level achievable by 1P excitation. This enhanced excitation allows imaging to take place only within the specific spot size of irradiating light. Since the spot size of the light may be the same size or smaller than a cell, imaging of inside each cell may take place, which is impossible using a one-photon absorption scheme such as disclosed in the Bende patent.

Also, with the enhanced excitation achieved by the claimed invention, a light wavelength range may be used (e.g., near infrared) which is able to improve the observation ability in the resulting spectral image. This is also not possible with the technique disclosed in the Bende patent.

In summary, because the Bende patent does not teach or suggest the features added by amendment to claim 1, it is respectfully submitted that the Bende patent cannot render claim 1 or any of its dependent claims obvious.

Claim 18 has been amended to recite features similar to those which patentably distinguish claim 1 from the cited references. Applicant therefore respectfully submits that claim 18 and its dependent claims are allowable.

Claims 5-7 were rejected under 35 USC § 103(a) for being obvious in view of a Bende-Kitamori combination. This rejection is traversed on grounds that the Kitamori patent does not teach or suggest the features of base claim 1 missing from the Bende patent.

Claims 14 and 16 were rejected under 35 USC § 103(a) for being obvious in view of a Bende-Wang combination. This rejection is traversed on grounds that the Wang patent does not teach or suggest the features of base claim 1 missing from the Bende patent.

In view of the foregoing amendments and remarks, it is respectfully submitted that the application is in condition for allowance. Favorable consideration and timely allowance are respectfully requested.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this, concurrent and future replies, including extension of time fees, to Deposit Account 16-0607 and please credit any excess fees to such deposit account.

Respectfully submitted,

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